

**DEWARD A. DOISY DEPARTMENT OF BIOCHEMISTRY  
AND MOLECULAR BIOLOGY**

**HANDBOOK FOR GRADUATE STUDENTS**

**February, 2023**

**DOCTOR OF PHILOSOPHY PROGRAM**  
**Edward A. Doisy Department of Biochemistry and Molecular Biology**

**Entry into the Departmental Program through the Graduate Program in Biomedical Sciences:**

Typically, entry into the Department's Ph.D. Program occurs after admission into the Graduate Program in Biomedical Sciences and completion of two semesters of course work in that program. At the end of this integrated first year program, students who elect to obtain a Ph.D. in Biochemistry and Molecular Biology will have selected a mentor in the Department in the summer of their first year.

**Direct entry into the Departmental Program as a second-year student:**

Students who have completed graduate level course work or have obtained a master's degree from another institution could be admitted to the Departmental Ph.D. program directly as second-year graduate students. Saint Louis University limits the number of credit hours that may be transferred from another institution to no more than eight credit hours. Accordingly, direct entry students will be required to complete additional course work beyond that of a student entering through the Graduate Program in Biomedical Sciences (*vide supra*) to fulfill the credit hour requirement for the Program. The costs (stipend, tuition and insurance) for the second year will have to be covered by the mentor's laboratory. It will be thus necessary for these students to identify a Ph.D. mentor willing to accept them to their laboratory before admission to the program is granted. Direct entry applicants should complete the application to the Graduate Program in Biomedical Sciences (<https://www.slu.edu/medicine/medical-education/graduate-programs/index.php>) and forward a copy of it to the Director of Departmental Graduate Program (tomaz.heyduk@health.slu.edu) together with detailed information about the applicant's previous graduate course work. The Departmental Admissions committee will review the applications and the applications selected for admission to the program will be forwarded to SLU Graduate School for a final approval.

**Direct entry into the Departmental Program as a MD/Ph.D. student:**

MD/Ph.D. students also enter the Departmental Graduate Program as second-year students. These students will take the BCHM-6250 course and additional courses that will be determined in consultation with the student's Ph.D. mentor and the Departmental Graduate Program Director.

### **Synopsis of the Program:**

Upon entering the program students take advanced courses in biochemistry and molecular biology and begin research on their dissertation project under the guidance of their faculty advisor. Our advanced courses emphasize self-directed learning and independent study with individualized support and guidance from the teaching faculty. Advancement requires that students pass a written and oral examination. The Preliminary Examination consists of the preparation and evaluation of a written proposal describing plans for the thesis project. The written proposal is developed as part of the BCHM-6250 course and the written preliminary examination requirement is satisfied by passing the BCHM-6250 course in the second (spring) semester of the second year in the program. The oral Comprehensive Examination is the oral defense of that proposal and a comprehensive examination of the student's knowledge in biochemistry and molecular biology. Subsequent years are devoted to dissertation research and participation in the Biochemistry Journal Club. A committee of a minimum of three faculty members (including the Ph.D. Mentor) made up of at least 2 biochemistry faculty members advises the student and reviews their progress toward the Ph.D. at least once a year until the completion of the degree. Optional opportunities for additional training in teaching or other career-related topics are available.

### Typical timeline and important check points for the Program

#### *First Year in BMB Program:*

|                          |  |
|--------------------------|--|
| <b>Fall</b>              | BMB Classes  |
| <b>Fall (December)</b>   | Meet with Course Directors for BCHM-6250 course to describe the outline of the course and answer questions |
| <b>Fall (December)</b>   | Students select Examination Committee for BCHM-6250 course and Preliminary Examinations.                   |
| <b>Spring (May)</b>      | Completion of BCHM-6250 course and passing of Written Preliminary Exam                                     |
| <b>Spring (May-June)</b> | Oral Preliminary Examination   |
| <b>Summer</b>            | Selection of Dissertation Committee  |

#### *Second Year in BMB Program:*

|                                |   |
|--------------------------------|---|
| <b>Anytime during the year</b> | Submission of Thesis Proposal for external funding  |
| <b>Spring</b>                  | First progress meeting with Dissertation Committee. |

**Fall** Journal Club session for short presentations on students' own research

**Fall (Nov-October)** Yearly progress meeting with Dissertation Committee.

*Subsequent Years in BMB Program:*

**Anytime during the year** Journal Club presentation on students' own research

**Fall (Nov-October)** Yearly progress meetings with Dissertation Committee

*Graduation Year:*

**Two weeks before the date of the oral defense of the dissertation** Draft of dissertation sent to Dissertation Committee and to Candidacy Specialist in Graduate Education office.

**Oral defense of dissertation and graduation!**

**Course Requirements:**

Students entering the Department via the Graduate Programs in Biomedical Sciences will have completed the following courses during their first year in the program:

| <b>Course #</b>        | <b>Credit Hrs.</b> | <b>Course Title</b>                                  |
|------------------------|--------------------|--|
| <b>Fall Semester</b>   |                    |  |
| BBS-5010               | 5                  | Basic Biomedical Sciences I                          |
| BBS-5020               | 4                  | Special Topics in Basic Biomedical Sciences I        |
| BBS-5920               | 1                  | Basic Biomedical Science Colloquium                  |
| BBS-5970               | 2                  | Introduction to Basic Biomedical Research            |
| <b>Spring Semester</b> |                    |  |
| BBS-5030               | 5                  | Basic Biomedical Sciences II                         |
| BBS-5040               | 4                  | Special Topics in Basic Biomedical Sciences II       |
| BBS-5100               | 0                  | Ethics for Research Scientists                       |
| BBS-5920               | 1                  | Basic Biomedical Science Colloquium                  |
| BBS-5970               | 2                  | Introduction to Basic Biomedical Research            |
| <b>Summer Semester</b> |                    |  |
| ORES-5200              | 3                  | Introduction to Biostatistics in Biomedical Sciences |
| BCHM-6280              | 2                  | Introduction to Genomics and Bioinformatics          |

**Credit hours in the Graduate Programs in Biomedical Sciences: 29**

An additional 11 hrs. of coursework in Biochemistry and Molecular Biology and 12 hrs. of dissertation research are required for students seeking a Ph.D. in the Department.

**Total Credit Hours:** 29 hrs. Required Basic Biomedical Science Courses

Courses 11 hrs. Required Biochemistry and Mol. Biology

40 hrs. Course work

12 hrs. Dissertation Research

52 hrs. TOTAL

A typical schedule of required second year courses for the students entering into the Department's Ph.D. Program after completing the first year of Graduate Program in Biomedical Sciences is provided below. A schedule for MD/Ph.D. students will be determined on individual basis in consultation with student's Ph.D. mentor and Director of Departmental Graduate Program. *Students are required to attain a grade of "B" or better in all required Biochemistry courses and maintain at least a "B" average in all other courses. Receiving a grade of "B-" or less in a Biochemistry course will place a student on probation, and the course may have to be retaken.*

**Biochemistry Courses:**

**Fall Semester**

|           |   |   |
|-----------|---|---|
| BCHM-6230 | 4 | Macromolecules: Structure, Function, and Interactions |
| BCHM-6240 | 3 | Advanced Topics in Biochemistry and Molecular         |
| Biology   |   |   |
| BCHM-6920 | 1 | Colloquium  |

**Spring Semester**

|           |   |  |
|-----------|---|--|
| BCHM-6250 | 3 | Preparation & Evaluation of Science Research |
| Proposal  |   |  |

(0-4) Optional electives

**Complains and resolution of conflicts:**

Complains regarding faculty or fellow students' conduct should be brought first to the attention of Ms. LaChina McCoy (Senior BMB administrator, 314- 977-9204, lachina.mccoy@health.slu.edu). Ms. McCoy will assist the student with the most appropriate action depending on the exact nature of the alleged misconduct.

Resolution of conflicts between the student and mentor, the Examination Committee members, or the Dissertation Committee members will be mediated by BMB Chair in consultation with the Training Committee.

All appeals to the decisions made to resolve complains and conflicts will be first considered by BMB Chair in consultation with the Training Committee. If a mutually acceptable resolution is not achieved, at the discretion of the student, further appeals could be made according to standard University-approved policies.

## COURSE DESCRIPTIONS

### **Introduction to Genomics and Bioinformatics BCHM-6280**

(elective for advanced entering students)

#### **A. Goals:**

1. To provide students with the skills necessary for finding and analyzing information in the biological sequence, genome and biomolecular databases.
2. To develop the skill of writing a results section of a manuscript.

#### **B. Achievement of Goals:**

1. Students will attend 10 lectures, complete 9 computer-based problem sets and a final exam over a 5-week period
2. Students will be provided with tutorials for each computer problem set and an hour during which the course director will be present while they work through the tutorial.
3. Students will be provided with written guidelines on how to write a results section of a manuscript.
  - a. The written response for each computer problem set will be done in the format of a results section for a manuscript
  - b. The course director will grade the problem sets on the completeness of the information provided and on how well the provided guidelines were followed.
  - c. The course director will provide feedback on each problem set and will be available to answer questions and provide guidance as the students complete the problem sets.
  - d. The course director will make it clear to the students that attendance at lectures is required and that failure to do so will influence the student's grade.
  - e. The course director will make it clear to the students when problem sets and exams are due and that failure to meet those deadlines will result in deduction of points from assignments.
  - f. The course director will make it clear to the students that each problem set is to be written individually and that failure to do so will either influence the student's grade or result in failure of the course.

#### **C. Expectations:**

1. Students will be given sufficient background to utilize the online databases and analytical tools to complete the assigned problem sets and exams.
2. Students are expected to attend all lectures.
3. Students may consult with each other on the problem sets, but they are expected to write up the results individually.

### **Macromolecules: Structure, Function, and Interactions (BCHM 6230)**

#### **A. Goals:**

1. To integrate the techniques and knowledge of physical biochemistry, enzymology, molecular biology, and metabolism in solving research-oriented problems in macromolecular structure, function and interactions.
2. To sharpen creative, analytical, and critical thinking skills
3. To learn how to independently seek out the information needed to solve research-oriented problems.

#### **B. Achievement of Goals:**

1. Students complete self-directed problem-solving exercises and laboratory demonstrations covering concepts and methodology in the analysis of enzyme catalysis, protein-protein interactions, protein-nucleic acid interactions, protein function and regulation.
2. Students use scientific databases to access primary sequence and 3-D structural data, use specialized programs to manipulate this data, and incorporate the analyses into experimental design and analysis.
3. Faculty supervisor(s) provide the initial outlines for the exercises, provide advice and assistance during completion of the exercises, and evaluate the results of the exercises.

#### **C. Expectations:**

1. Students learn to independently investigate available information and resources needed to design experimental approaches and critically evaluate data.
2. Students learn to discuss and defend the rationale of research plans and expected results.
3. Students learn to manage time in independent study to complete the objectives of the exercises within the allotted time period.

### **Advanced Topics in Biochemistry and Molecular Biology (BCHM-6240)**

#### **A. Goals:**

1. To advance student understanding of biochemical mechanisms, principles and concepts.



2. To exemplify the importance of those principles in understanding both the mechanisms of pathogenesis and the rationales for treatment of human diseases.
3. To identify gaps in knowledge and propose studies to fill these gaps.

**B. Achievement of Goals:**

1. Students will attend lectures three days/week in which key points are discussed.
2. Students will supplement this information with assigned readings, in the form of original research articles or reviews.
3. Students will develop hypotheses based on background information.

**C. Expectations:**

1. Students are expected to gain a more in-depth knowledge of biochemical processes and their regulation.
2. Students are expected to critically evaluate the assigned readings and demonstrate knowledge of both the content and concepts as they apply to the class.
3. Students are expected to gain an appreciation of the medical applications of the fundamentals of biochemistry to human diseases.
4. Students are expected to develop specific aims to test hypotheses focusing on filling gaps in understanding biochemical processes underlying human diseases.

**Colloquium (BCHM-6920)**

**A. Goals:**

1. To assist students in learning the techniques for assimilation of information and critical analysis of scientific literature in order to present an oral review of the topic in a coherent manner.
2. To develop a skill of being an active audience in scientific seminars and to encourage active participation in scientific public discussions.

**B. Achievement of Goals:**

1. A fixed time of the week is chosen so that presentations will occur on a regular basis.
2. The faculty member in charge of the course is expected to:
  - a. Coordinate the dates of student presentations.
  - b. Approve the selection of papers to be presented. In this regard, students should be informed that they are not permitted to present any papers already presented, discussed, assigned, read, etc. in any other courses or journal

clubs.

Topics for a particular student are to vary in each of his presentations and are

not to deal with the student's research area.

- c. Rehearse with students at least once prior to their presentation.

Encourage

students to rehearse with faculty members expert in the areas chosen and help

students to identify such individuals. In cases where a student has difficulty

arranging such rehearsals, the course director should be available for assistance.

- d. Assure that registered students attend each session. The course director

should make it clear to the students that attendance is required and that failure to do so will influence the student's grade.

### **C. Expectations:**

1. Students will be trained in formal presentation.
2. Trainees are expected to attend all presentations and actively participate.

# **Written Preliminary Examination (Grant Writing Course, BCHM-6250) and Oral Comprehensive Examination**

**Course Directors: Dr. Susana Gonzalo and Dr. Nicola Pozzi (2022)**

***SECTION 1 – Overview, Goals, and Possible Outcomes***

***SECTION 2 –Timeline***

***SECTION 3 – The Committees***

***SECTION 4 – Guidelines for Written Proposal***

***SECTION 5 – Guidelines for Oral Comprehensive Examination***

## **SECTION 1**

### **Overview**

Two steps are required to advance to dissertation status. **STEP 1** is the Grant Writing Course (BCHM-6250). It entails the preparation and evaluation of a **Written Proposal** covering topics related to the students' thesis. Passing BCHM-6250 is equivalent to passing Written Preliminary Examination. **STEP 2** entails an **Oral Comprehensive Examination**. The student is asked to defend his/her Written Proposal and answer questions relevant to the field of biochemistry and molecular biology. Passing STEP 1 is required to proceed to STEP 2.

### **Goals**

1. To teach **the skills for developing and writing compelling scientific proposals**.
2. To test the student's ability to formulate **substantial and testable hypotheses** to address a specific scientific question that is highly relevant to the field under investigation.
3. To determine the student's ability to design **well-reasoned and controlled experiments** that test the hypotheses elaborated in point 2.
4. To determine the student's ability **to present the proposed research plan both orally and in writing**. Presentation of the proposal must follow NIH Predoctoral Fellowship application guidelines (NRSA F31).
5. **To submit** the written proposal to NIH. Other funding sources may be considered, too.

### ***Possible outcomes of STEP 1, the BCHM-6250 (Written Preliminary Examination)***

The Course Directors assign a letter grade based on recommendations by voting members of student's Committee. The grade should reflect the overall effort and engagement of the student during the course, the quality of the short oral presentation, the quality of written proposal and the quality of the response to the critiques. If a failing grade is received (Grade B- or lower), Departmental Training Committee and Program Director will vote on action most appropriate for a given student considering the entire student academic portfolio. The possible actions include dismissal from the program, repeating the course next year, or a specific remedial action that could be accomplished in short time to amend the grade.

### ***Possible outcomes of STEP 2, the Oral Comprehensive Examination***

Obtaining a passing grade for STEP 1 is required before scheduling STEP 2. The possible outcomes of STEP 2 are pass or fail. If fail grade is received, the student may repeat the Oral Comprehensive Exam next semester. If fail grade is received again, the student will be dismissed from the program. The final decision will be made by Training Committee in consultation with student's committee.

## **SECTION 2**

### ***Overview and Timeline (Exact dates will be set each year)***

**Fall Semester (December)** - Course Directors meet with the students to describe the outline of the course and answer questions.

**Fall Semester (December 31)**- Students identify a topic and select a committee. The committee is formed by the Thesis Advisor (non-voting member) and five voting members: BMB PhD Program Director Dr. Tomasz Heyduk; Course Directors Dr. Susana Gonzalo and Dr. Nicola Pozzi; two Faculty members selected by the student with sufficient familiarity with the topic, who act as grant reviewers.

*Note: If Program Director or Course Directors have a Thesis Advisor role, they will be excluded as voting members and substituted by another Faculty member.*

**January** - First lecture of grantsmanship (by Course Directors or guest speaker): how to write a grant proposal.

**January** - Students submit Title and Specific Aims to the committee. The Aims must test a new hypothesis developed by the student in the context of ongoing research in the Thesis Advisor's laboratory. The Thesis Advisor provides a letter to the committee specifying the degree of overlap between his/her current research grants and the student's project.

**January** - Students deliver a short (15 min) oral presentation of the Specific Aims to the committee. The committee decides whether the student's anticipated research proposal is "defendable" (i.e., the Specific Aims are approved) or whether changes need to be introduced for approval.

**February** - Students meet with Course Directors to discuss progress in grant writing.

**March** - Students submit the entire written proposal (i.e., mid-term proposal) to the committee.

**March** - Students deliver an oral presentation of the mid-term proposal to the committee.

**March** - Written critiques by five voting committee members on mid-term proposal are returned to the student.

**March** - Second grantsmanship lecture: how to respond to reviewers' critiques

**April** - Students submit final version of the proposal to each member of his/her committee and include responses to critiques.

**April** - Evaluation and grading of the final version of the proposal. The committee will determine the final grade for the BCHM-6520 course. Grade B or higher is necessary to pass the course and Written Examination.

**May** - Students who passed the Written Examination schedule the Oral Comprehensive Exam.

**Anytime during the third year in the program.** Students are to submit the proposal to NIH (Predoctoral Fellowship application (NRSA F31)), or other funding source.

## **SECTION 3**

### ***Role of Thesis Advisor***

The student is encouraged to consult with his/her Thesis Advisor on a regular basis throughout the preparation of the grant proposal. The Thesis Advisor is expected to ensure that the Specific Aims of the proposal are meaningful and promote independent thinking of the student. Thesis Advisors should not provide new ideas or solutions to existing problems but will point to weaknesses of the hypothesis, experimental approach, presentation, etc. They should not give copies of current or previous grant applications to students, nor should they edit the student's written proposals. The student is also encouraged to consult with any other faculty, students, or postdocs as they develop their ideas.

### ***Composition and Role of Examination Committee***

It consists of 1 Thesis Advisor, 2 Reviewers, 2 Course Directors and the BMB PhD Program Director. Course and Program directors are present in meetings to ensure uniformity in decisions. Course Directors will meet students on a regular basis, at least once per month, either in a group or a one-on-one format, to ensure proper progress. Reviewers meet with students in January for approval of Specific Aims, in March for oral presentation of the midterm proposal. Reviewers write NIH-style critiques of midterm and final written proposals. Course Directors assign final letter grade for the BCHM-6250 course and pass/fail grade for the Oral examination based on committee recommendations.

## SECTION 4

### **Guidelines for Written Proposal (STEP 1)**

The proposal is expected to identify and address a specific scientific question that is highly relevant to the field under investigation. Proposals should aim to gain new knowledge and not merely incremental knowledge. The proposal should be "hypothesis-driven". That is, the student is expected to formulate a hypothesis based on current knowledge and/or preliminary data. The student is then expected to identify key experiments to prove the hypothesis. The proposal should describe work that can be accomplished by one person in 3-4 years, not by an entire lab. While rigorous and scientifically sound, the written proposal may not reflect work present in the final Dissertation Thesis. Hence, approach and experiments may change over time with input from the Thesis Advisor and the Thesis Committee.

#### **Proposal format**

The proposal must follow NIH Fellowship Application guidelines (NRSA F31) (<https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/page-limits.htm#fell>). The cover page which should include the name of the student, the name of the advisor, the title of the proposal. *The student is responsible for all scientific aspects of the proposal*, including background information, approach, experimental design, and methodology for all experiments.

The proposal should be crafted with the following section headings, using single spaced, 11-point Arial font, 0.5-inch margins, and the indicated page limits.

- **Cover Page (1 page):** proposal title, student's name, mentor's name.
- **Project Abstract (30 lines or less):** Clear, concise description of the proposed work, understandable to any scientifically literate reader.
- **Project Narrative (three sentences).**
- **Introduction to Resubmission** (not needed for initial submission) **(1 page).**
- **Specific Aims (1 page):** There are three objectives for this page.
  - a) Focus the reader's attention on the problem being addressed.
  - b) Present the hypothesis to be tested.

- c) Provide an outline of the experiments testing that hypothesis. Use one or two paragraphs to address the first two objectives. Then outline the experimental approach in (usually) two Specific Aims, where each aim reflects a major experiment or experimental category.
- **Research Strategy (6 pages):** There are two objectives in this section.
  - a) Communicate the Significance of the question using a brief, but scholarly review of the field to explain the importance of the problem central to the proposal. Move from the general to the more specific. Additionally, describe how scientific knowledge would be increased if the proposed aims were achieved.
  - b) Convey the Approaches proposed to address each aim, by restating its hypothesis and briefly describing the rationale behind it. Then, for each aim, describe the Experimental Approach and Analysis, Expected Results and Interpretations, and Potential Pitfalls and Alternative Approaches.

There is no expectation that extensive preliminary data should exist, but if it does, present it within the **Research Strategy** section (remaining within the 6-page limit). For example, you might provide such data as part of the rationale or justification for a particular approach. Any preliminary work that represents unpublished data of others from the thesis lab should be explicitly approved by those providing such data and be properly cited.

- **Human tissue or Animal use** (limit of 0.5 page): For proposals involving the use of human tissues or vertebrate animals, please justify why this use is essential to achieving the goals of the proposal. For animal use, also justify the numbers required to accomplish the proposed experiments.
- **Literature Citations** (no page limit): Each citation should be numbered in the body of the proposal; in the bibliography, each citation must include names for all authors, article title, journal (or book name), volume and page numbers, and year of publication.

## **SECTION 5**

### ***Comprehensive Oral Examination (STEP 2)***

Upon passing STEP 1, students are expected to schedule a time for the Oral Comprehensive Exam. This will occur during the first two weeks of May. If scheduling issues prohibit scheduling exam within first two weeks of May, students should work with Course Directors to schedule exam as soon as possible.

The oral exam will consist of an oral presentation in which the student is expected to defend the content and approach of the written proposal. The oral exam also offers the opportunity for a comprehensive examination of the student's knowledge of biochemistry



and molecular biology. The Course Directors will serve as chairs of each examining committee to ensure uniformity in decisions and transparency.

The student should present their proposal using no more than 30 minutes. During the oral qualifying exam, the student should demonstrate:

- Mastery of knowledge concerning the background, methods, and literature related to their specific project.
- A firm grasp of biochemistry and related areas of molecular biology, especially as they relate to lecture and seminar courses taken, and independent studies and rotations completed.
- The ability to think critically, defend the proposed science, and communicate reasonably well.
- General student motivation and track record in terms of work ethic and lab aptitude. Responsible conduct of research, general motivation, and scholarship are also expected to be satisfactory.

Exam questions should be designed to probe the student's depth of knowledge about the proposal, both theoretical and technical. In addition, exam questions should determine the student's general knowledge of biochemistry, especially as it relates to lecture and seminar courses taken, and independent studies and rotations completed. Special emphasis should be placed on questions designed to elicit the ability of a student to describe how an experiment was or will be done and how to interpret it appropriately. When the committee feels that the student has been examined sufficiently, they will excuse the student and the committee will discuss the performance. Each student's performance should be evaluated in three areas: 1) quality of the oral presentation, 2) defense of the proposal, and 3) general knowledge.

## **SECTION 6**

### ***Submission of the proposal for external funding***

Students are required to submit their proposals developed in **BCHM-6250** for funding consideration by external sources (for example, NIH, AHA). The time window for submission is the academic year following the passing of Preliminary Exams (third year in the program). Submission of proposals for external funding will be the pre-requisite to continue as a Doisy Scholar.

### **Optional Elective Courses:**

With the consent of their faculty advisor, graduate students may take elective courses in the second and third year of graduate training. Students typically take electives in order to fulfill the Graduate School requirement of at least 36 hours of course work. Tuition for the elective courses will be covered by the Department. These may be selected from a wide variety of courses given at Saint Louis University, Washington University, or the University of Missouri at St. Louis. Some examples of the possible elective courses offered at Saint Louis University Medical School are:

- Biochemistry and Molecular Biology Journal Club (BCHM-6910)
- Introduction to Bioinformatics and Genomics (BCHM-6280)
- Virology (MB-6350)
- Basic Immunobiology (MB-6650)
- Signal Transduction Mechanisms (PPY-6550)
- Pharmacology and Physiology of the Nervous System and Selected Topics in Neuropharmacology (PPY-6660)
- Advanced Tumor Virology (MB-6500)
- Reading Course (BCHM-6980)
- Research Topics (BCHM 6970)

## **ADVANCEMENT TO CANDIDACY, DISSERTATION RESEARCH, THESIS COMMITTEE, PROGRESS REPORTS, AND RESEARCH EVALUATIONS**

After successfully completing all required course work and passing both the Written Preliminary Examination and the Oral Comprehensive Examination, students are advanced to Ph.D. candidacy and focus primarily on their dissertation research. A Dissertation Committee is formed with the student's mentor as a chair of the Committee. This committee should have a minimum of three members (student's mentor plus typically two members of the dissertation committee) and it will continue to monitor student progress toward completion of the dissertation research. There could be more than three members of Thesis Committee (including faculty from other Departments or outside SLU) if this could be beneficial for advising the student in his/her research. Regardless of the total number of Committee members, at least two have to be from the Department. Thesis Committee should be considered an important resource for guidance, support, and perspective on all aspects of the dissertation research experience. Students are encouraged to interact with the members of their committee on an informal basis throughout the year. In the event that a student finds it necessary to make a major change(s) in their proposed dissertation research, they are required to prepare a proposal outlining the changes and call a meeting of their committee at the time that the changes are made. All students are required to submit a progress report and meet with their committee for a research progress evaluation every year between Sept. 1 and Nov. 1 except for the year following passing the Preliminary Exam. During this year the students should schedule a meeting in the Spring semester (this will be the first meeting with the committee since no meeting is required in the fall immediately following passing preliminary exams) in addition to the regular yearly meeting between Sept. 1 and Nov. 1. Students entering their 5<sup>th</sup> year in the Department will meet with their committee at least twice a year.

### **A. Goals:**

1. Encourage students to periodically review their data from the perspective of integrating it into a publishable work.
2. Alert students when specific weaknesses in their performance are detected, and provide support and assistance in rectifying them.
3. Provide students with a clear and reliable yardstick by which to measure their progress toward completion of their dissertation research.
4. Ensure that the dissertation is completed in a timely fashion.

### **B. Achievement of Goals:**

1. Students who have defended their dissertation proposal will arrange a meeting of their committee between Sept. 1 and Nov. 1 each year. Permission of the promotions committee is required to schedule this meeting outside this interval.

2. Students will prepare a written progress report of no more than four double-spaced, typed pages (minimum 10 point font, 0.5 inch margins). This report should include:
  - a. A short paragraph reviewing the background of the project.
  - b. A list of the original specific aims, posed as hypotheses being tested.
  - c. A brief description of the work accomplished toward these aims in the previous year, as viewed from the perspective of integrating the data into a publishable report(s):
    - i. What are the most important data and what conclusions can be drawn from them?
    - ii. How do these data fit the original hypothesis?
    - iii. What additional experiments/controls are needed to make a publishable story?
  - d. A list of any minor changes or adjustments needed in the original specific aims with a brief justification.
  - e. A realistic timetable of work to be accomplished in the following year. The progress report is submitted to the members of the student's thesis committee at least one week prior to the scheduled meeting.
3. At the scheduled meeting, students present their data and discuss the details of the written report with their committee.
4. Each committee member is expected to rate the student's performance ("outstanding," "satisfactory" or "unsatisfactory") in each of 10 areas, and provide the student with constructive suggestions for improvement.
  - a. The quality of the written report
  - b. Quality of the presentation
  - c. Suitability of timetable for the next year
  - d. Knowledge of the literature
  - e. Ability to answer questions
  - f. Soundness of the conclusions drawn from the data
  - g. Treatment of alternative interpretations of the data
  - h. Ability to formulate research questions as hypotheses to be tested
  - i. Relevance of the data to the specific aims
  - j. Ability to formulate research questions as hypotheses to be tested
  - k. Research productivity/completion of specific aims
5. Each committee member is expected to submit a completed evaluation form for the student's records. Copies are given to the student and the promotions committee. A majority of the total ratings (10 for each reviewer) must be satisfactory or outstanding to attain a passing grade for the fall term of "Dissertation Research."
6. An "unsatisfactory" rating by the committee, failure to schedule a review meeting during the required interval, failure to submit an acceptable progress report on time, or failure to involve committee members when a

major change in the dissertation research is made will automatically result in an unsatisfactory "Dissertation Research" grade for the fall term and one year of academic probation. The terms of this probation are:

- a. The student must arrange a meeting with his thesis committee prior to the end of each of the next three academic terms (i.e., for one year) for an interim progress evaluation, and assignment of the Dissertation Research grade. A waiver must be requested from the promotions committee if the meeting will be delayed, or an unsatisfactory grade will be given.
- b. Probation is terminated if a student attains at least one satisfactory grade during the year.
- c. Three unsatisfactory research progress grades while on probation, or five total, will be cause for dismissal from the program.

### **C. Expectations:**

1. Skills in expository writing and oral presentation of data will be polished.
2. Critical thinking skills and the ability to formulate testable hypotheses will be reinforced.
3. Unsatisfactory performance will be identified for timely remedial action.
4. Students will acquire the ability to develop realistic research timetables.
5. Steady progress toward timely completion of dissertation research will be

### **Additional Requirements**

All graduate students in the Department are expected to attend the **Biochemistry Journal Club** on a regular basis and do at least one paper presentation in the Club. The Journal Club is also intended to provide additional opportunity for the students to present their research to the entire BMB community. To this end, senior students (4<sup>th</sup> year and above) are required to give a Journal Club presentation on their own research each year. For the 3<sup>rd</sup> year students, a day near the end of Fall semester will be selected for all the students to give 20 min presentations on their research together in one session.

All graduate students are expected to attend and actively participate in the weekly departmental seminar program in which invited scientists from all over the world present their research. Students are also expected to participate in the annual Fall Biochemistry retreat and/or research poster session. Graduate students in their third year of training are required to present posters outlining their research results at this event.

### **Defense of the Dissertation**

When a student has completed his/her dissertation research to the satisfaction of his/her dissertation committee, the student prepares a written dissertation according to the guidelines provided by the Graduate School. When a draft of this dissertation has been

approved by the Thesis Committee, it is submitted to the Candidacy Specialist in Graduate Education office (Christine Harper, [christine.harper@slu.edu](mailto:christine.harper@slu.edu); 977-2243) at least three weeks before the date of the oral defense of the dissertation. The oral defense takes the form of a one-hour formal presentation of the dissertation research to an audience consisting of: the Thesis Committee, members of the department, and scientists from other departments and universities. The presentation is followed by an oral examination by the Thesis Committee. Final approval is contingent on the unanimous positive evaluation of the Thesis Committee. The Ph.D. is awarded after the final written version of the dissertation is presented to the Graduate School.

## **GUIDELINES FOR CONDUCT OF THE PUBLIC, ORAL PRESENTATION/ DISSERTATION DEFENSE**

### **A. Scheduling/Announcing the Defense:**

1. As soon as the date and place of oral defense is set, the Candidate must notify the Candidacy Specialist (Christine Harper, [christine.harper@slu.edu](mailto:christine.harper@slu.edu); 977-2243) of the oral defense.
2. The Candidate must contact Candidacy Specialist (Christine Harper, [christine.harper@slu.edu](mailto:christine.harper@slu.edu); 977-2243) no less than six weeks prior to the defense date for a list of other documentation to be submitted prior to defense. Candidacy Specialist will also provide the current procedures that will need to be followed in preparation for defense.

### **B. The Graduate Education Office Announcement:**

1. The Graduate Education Office will prepare and distribute an announcement of the date, time, and location of the presentation/defense to a mailing list established by the major field.
2. Department will also distribute the announcement throughout the School of Medicine.

### **D. Time:**

1. The Candidate's initial comments should be 30 minutes to one hour in length, followed by a question-and-answer period.
2. The entire presentation/defense should not exceed two hours.

### **E. Protocol:**

1. The dissertation committee chairperson will introduce the Candidate, and the Candidate may use available audio-visual or other appropriate materials.
2. The Candidate is expected to complete his/her presentation prior to questioning. However, spontaneous questioning for clarification is acceptable and the Candidate should be aware of this in advance.
3. All questions should be recognized by the dissertation committee chairperson. The chairperson is expected to be in control of the defense and has the sole authority to recognize others who wish to ask questions or comment.

**F. Balloting:**

The Thesis Committee will meet immediately following the conclusion of the defense to discuss their evaluations of the Candidate and the dissertation. The committee's ballot is to be submitted to the Candidacy Specialist in Graduate Education office with the final copies of the dissertation. If the committee requires minor revisions of the dissertation following the defense, then the ballot should be withheld until every committee member is ready to cast his or her final vote. A unanimous positive evaluation of the dissertation committee, that is, all members whose signatures appear on the Candidate's approved prospectus, is necessary for final approval of the dissertation.

**G. Appeals:**

Should the Candidate not be approved for graduation because of one negative vote from a dissertation committee member, s/he may appeal. Graduate Education office will advise the Candidate regarding the procedure for the appeal.

## THE FACULTY AND THEIR RESEARCH DESCRIPTION

**Edwin Antony.** Professor; Ph.D. Wesleyan University, 2005. Studies on enzymes that function in DNA repair, recombination and electron transfer.

**Yuna Ayala,** Associate Professor; Ph.D. Washington University-St. Louis 2001. Studies on RNA binding protein function in eukaryotic mRNA processing and in neurodegenerative diseases.

**Ángel Baldán,** Professor; Ph.D. University of Barcelona (Spain), 2002. Sterol homeostasis and in the molecular mechanisms involved in the conversion of macrophages into foam cells.

**Yie-Hwa Chang,** Associate Professor; Ph.D., Caltech, 1987. Biological function of methionine aminopeptidases; N-terminal processing in eukaryotic cells; protein processing and angiogenesis; development of new anticancer drugs.

**Gucan “Gabriel” Dai,** Assistant Professor; Ph.D., Washington State University, 2014. Biophysical and structural mechanisms of ion channels, Principles of bioelectricity, and the biochemistry of Excitable membranes.

**Reza Dastvan.** Assistant Professor; Ph.D. Goethe University, Germany, 2013. Membrane transporters and molecular mechanisms in neoplastic and neurodegenerative diseases.

**Enrico Di Cera,** Alice A. Doisy Professor and Chairman of the Department; M.D., Catholic University (Italy), 1985. Structure and function of trypsin-like proteases, especially the molecular determinants of substrate specificity and allosteric regulation.

**Joel C. Eissenberg,** Professor; Ph.D., North Carolina at Chapel Hill, 1982. Mechanism of gene activation and gene silencing as well as aspects of transcriptional regulation using *Drosophila melanogaster*.

**David A. Ford,** Professor and Director of the Center for Cardiovascular Research; Ph.D., Missouri–Columbia, 1984. Biochemical mechanisms responsible for the pathophysiological sequelae of macro and microvascular disease, including sepsis-caused microvascular dysfunction and multiorgan failure, atherosclerosis, and ischemic heart disease.

**Susana Gonzalo,** Professor; Ph.D., Washington University School of Medicine, 1999. Nuclear architecture, chromatin structure, and genomic instability in aging and cancer.

**Tomasz Heyduk,** Professor of Biochemistry and Molecular Biology; Ph.D., Wroclaw Technical (Poland), 1986. Molecular mechanisms of transcription and development of technologies for detection and imaging of biomolecules.



**Sergey Korolev**, Associate Professor; Ph.D., Russian Academy of Science, 1993. Structural and functional studies of DNA recombination, tumor suppressors, and neurodegeneration-related phospholipases.

**Kyle McCommis**, Assistant Professor; Ph.D. University of Missouri, College of Veterinary Medicine, 2013. Studies on the fundamental aspects of mitochondrial metabolism and novel areas of inter-organ and cell to cell communication.

**Nicola Pozzi**, Associate Professor; Ph.D. University of Padua, Italy, 2010.. Structure-function and single-molecule studies of oxidoreductases complement and clotting factors.

**Dorota Skowrya**, Associate Professor; Ph.D. Gdansk (Poland), 1991. Studies on the role, function and regulation of the ubiquitin-proteasome system in health and disease.

**Fran Sverdrup**, Associate Professor; Ph.D. University of Pittsburgh School of Medicine, 1994. Epigenetic control of gene expression in facioscapulohumeral muscular dystrophy (FSHD) and the discovery of drugs to modulate this process.